START

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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 603864

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [ ] Direct Revision [x] Change ECN [ ] Temporary [ ] Standby [ ] Supersedure [ ] Cancel/Void [ ]	S. G. Weiss, Env. Res. Eng., H6-02, 376-1683		11/2/93
	5. Project Title/No./Work Order No.: 200 Areas Ecological Sampling	6. Bldg./Sys./Fac. No.	7. Impact Level: 3Q
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[ ] Yes (fill out Blk. 11b) [x] No (NA Blks. 11b, 11c, 11d)	NA	NA KE 3-3-94 S G Weiss 11/2/93 Cog. Engineer Signature & Date	NA Cog. Engineer Signature & Date

12. Description of Change

Documents work as completed per WHC-SD-EN-AP-127, Rev 0. Significant text changes

MAR 1994 RECEIVED EPIC

13a. Justification (mark one)							
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As-Found	[ ]	Facilitate Const.	[ ]	Const. Error/Omission	[ ]	Design Error/Omission	[ ]

13b. Justification Details

Documents completed work

14. Distribution (include name, MSIN, and no. of copies)

R. A. Carlson (1) H6-03
P. M. Pak (5) A5-19
R. M. Mitchell (2) H6-04
S. G. Weiss (7) H6-02
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ENGINEERING CHANGE NOTICE

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15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[na] $	Savings	[] $	Delay	[na]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
none		

20. Approvals

Signature		Date	Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER	
Cog Engineer S. G. Weiss	SG Weiss	11/2/93	PE	
Cog. Mgr. R. A. Carlson	RA Carlson	11/2/93	QA	
QA R. L. Hand	RL Hand	11/9/93	Safety	
Safety			Design	
Security			Environ.	
Environ.			Other	
Projects/Programs				
Tank Waste Remediation System				
Facilities Operations			DEPARTMENT OF ENERGY	
Restoration & Remediation			Signature or Letter No.	
Operations & Support Services				
IRM			ADDITIONAL	
Other				

Date Received: 11/12/93 DS

INFORMATION RELEASE REQUEST

Reference: WHC-CM-3-4

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WHC-SD-EN-AP-127, Rev. 1

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Date Release Required
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Unclassified Category: UC-

Impact Level: 3Q

New or novel (patentable) subject matter? [X] No [] Yes
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Classification/Unclassified Controlled Nuclear Information	[]	[X]			
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Intended Audience
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SUPPORTING DOCUMENT

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6. Author RM Mitchell 11/2/93

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Mitchell, R. M. and S. G. Weiss, 1993, *Description of Completed Work for 200 Areas Ecological Sampling*, WHC-SD-EN-AP-127, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

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9. Impact Level 3Q

10. RELEASE STAMP

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RECORD OF REVISION	(1) Document Number WHC-SD-EN-AP-127	Page 1

(2) Title Completed
Description of Work for 200 Areas Ecological Sampling

CHANGE CONTROL RECORD

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1 RS	Text changes to document work as completed	S. G. Weiss SGW	R. A. Carlson RAC 12/9/93

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1.0 SCOPE OF WORK

This description of work details the sampling conducted during the summer of 1993 at the 200 Aggregate Areas. The sampling is part of the Limited Field Investigations for the Qualitative Risk Assessments to be conducted in the 200 Areas, in support of decisions on possible Interim Remedial Measures. This description of work covers fiscal year (FY) 1993 planned field activities: vegetation, insect, soil, and small mammal sampling at analog waste sites (terrestrial and riparian) within the 200 Areas to aid in evaluating contaminant pathways.

2.0 GENERAL REQUIREMENTS

All personnel performing work according to this description complied with the following:

- WHC-EP-0383, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990)
- WHC-CM-4-10, *Radiation Protection* (WHC 1988d)
- WHC-CM-4-11, *ALARA Protection Manual* (WHC 1988c)
- WHC-CM-4-3, *Industrial Safety Manual*, Vols. 1-3 (WHC 1987)
- WHC-CM-7-5, *Environmental Compliance Manual* (WHC 1988e)
- WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual* (WHC 1988a)
- Site-specific job safety analysis.

3.0 SAMPLING

3.1 DATA QUALITY OBJECTIVES

This plan relies on the Data Quality Objectives (DQO) work that has already been completed for the 200 Aggregate Area Management Study (see Chapter 8 in DOE-RL 1992). Additional specific DQO information for the ecological characterization and description of work follows. Much of this information is provided as background to explain the rationale for the sampling.

EPA (1989a) lists the expected output of an ecological characterization to be a basic inventory of the site's biota, an estimate of the current level of ecological effects based on the endpoints, an estimate of the magnitude of the toxic effects, and an estimate of the degree to which these effects can be attributed to contaminants and not habitat destruction.

EPA (1989b) enlarges on these expected outputs with several potential objectives for an environmental characterization:

(1) Determine the actual or potential threat of damage to the environment

(2) Define the extent of contamination

(3) Determine the actual or potential effects of contaminants on protected species, habitats, or special environments

(4) Document actual or potential adverse effects of contaminants

(5) Develop remediation criteria

(6) Evaluate the ecological effects of remedial alternatives, as part of a Feasibility Study.

EPA (1988) specifies that the characterization information should be used for an ecological risk assessment, which is to be conducted by the U.S. Department of Energy for the U.S. Environmental Protection Agency (EPA) and the Washington Department of Ecology (DOE-RL 1993a).

For some of these objectives, the work has already been done, or they are not practical to accomplish at this time. For instance, because of the preliminary nature of remediation alternatives, the use of ecological information to develop remediation criteria and to evaluate the ecological effects of remedial alternatives in the 200 Areas may be premature. Defining the extent of contamination is also of less concern in this environmental characterization, because more accurate information on the extent of the contamination is being gathered by operable unit limited field investigation characterization activities, such as well and borehole drilling and soil sampling. These data also will be used in the ecological Qualitative Risk Assessments. The Qualitative Risk Assessments will estimate the actual or potential effects of contaminants and will be used to guide interim actions and remedial actions.

While some information is available on contamination levels in biota, little information exists in the literature on bioconcentration factors (e.g., soil → plants → mice) of radionuclides and hazardous chemicals by vegetation and insects in arid regions. Most of the available uptake factors or transfer coefficients are for agricultural crops or high rainfall regions of the United States. Risk assessment models use estimated, or default, values for bioconcentration factors. The concentrations measured with the work presented here, because of the limited number of samples, may not be directly substituted into the models as the "absolute" values. However, these actual field results can be cited as "real-world" values that can be used in evaluating the modeled results.

Other differences between the modeled and field numbers may result from the model's assumptions that the contamination is spacially uniform, when it usually has a spotty distribution, higher in some places and lower in others. Thus, adjacent samples of sand or vegetation can show widely varying concentrations of a contaminant. Another aspect of this difference is reflected in the modeling assumption that each level of the food chain feeds

exclusively on equally contaminated organisms at the lower level. In fact, mice may eat vegetation from both inside and outside a contaminated area or spot, "diluting" the transfer of contaminants. Nonetheless, the availability of Hanford Site-specific data will benefit both qualitative and quantitative ecological risk assessments by providing environmentally relevant exposure scenarios for the risk assessment.

3.2 PROPOSED ECOLOGICAL ENDPOINTS

Available information on 200 Area ecology has been used to propose interim assessment and measurement endpoints, which were used to direct this sampling effort. Final endpoints will be established through the formal ecological risk assessment process.

3.2.1 Assessment Endpoints

Assessment endpoints should have ecological relevance (reflect important characteristics of the ecosystem and be functionally related to other endpoints), be reflective of societal values and policy goals, and be sensitive to the type of effects caused by the contaminant (EPA 1992). Potential endpoints proposed for 200 Area risk assessments are as follows.

(1) The health of riparian vegetation, because of its high ecological value in a desert environment, which makes it important in contaminant pathways. It should be recognized that riparian vegetation in the 200 Areas (except for some of West Lake) is an artifact of waste management processes. Upon cessation of the fluid releases, the riparian growth will revert to dryland vegetation.

(2) The health and contamination levels of small mammal populations (e.g., all species of mice), because of their abundance, past history of contamination, and importance to predators and potential contaminant pathway transfers.

(3) The health and abundance of a game species population (e.g., mule deer), because of its societal value for hunting and wildlife observation.

(4) The health and abundance of common predators (e.g., raptors, the loggerhead shrike), because of their local abundance, position on the pathway as consumer of both mice and insects, and protected status (state and federal candidate species).

All assessment endpoints represent some value to society and the particular biota have the ability to uptake and retain contaminants in tissue.

3.2.2 Measurement Endpoints

Because assessment endpoints are not always easily measured directly with respect to the effects from contaminations (e.g., raptor or shrike populations), measurement endpoints can provide an indication of the effects. In some cases (e.g., assessment endpoints numbers 1, 2, and 3 in

Section 3.2.1) the assessment endpoint can be directly measured and compared to toxicity data. The measurement endpoints must be relevant to the assessment endpoints and practical in terms of gathering data (EPA 1992).

3.2.2.1 Riparian Vegetation Endpoint. The health of riparian vegetation can be inferred from contamination levels in tissue, related to known ecotoxicologal effects. Recent growth of bulrush, cattails, and willows near ponds and ditches inside and outside of the fenced 200 Areas were sampled to help evaluate the uptake by riparian vegetation, important in the contaminant pathways for many wildlife species.

3.2.2.2 Small Mammal Endpoint. Mice (Great Basin pocket mice, deer mice, house mice) can be found in suitable habitats over the 200 Areas and consume cheatgrass seeds (a large portion of the biomass on disturbed areas such as waste sites), other vegetation, and insects. They are also significant in a contaminant pathway to many raptors and predators, such as loggerhead shrikes and owls. This limited trapping program for small rodents near selected waste sites and riparian areas will provide an indication of the probable average high body burdens (by sampling for mice with the most potential for contamination and averaging those caught at each site) in the 200 Areas. These levels in individual rodents, related to known ecotoxicological data (gathered in a separate literature search), will give an indication of the health of the populations and the potential for contaminant migration to predators.

3.2.2.3 Terrestrial Vegetation, Soil, and Insect Endpoint. To help quantify the contaminant movement through the pathways from soil to predators, samples of soil, deep-rooted vegetation, grasses (at terrestrial sites), and insects were also taken from the same locations as the mice. While the results will be only an approximation of contaminant transfer coefficients, they will provide a check of modeled data against actual levels.

3.2.2.4 Game Species Endpoint. Previous sampling efforts (Woodruff et al. 1991) have indicated that Hanford Site deer can have measurable contamination. The measurement endpoint for the health of game species will be the contamination levels in deer tissue (muscle, bone, and liver) related to known ecotoxicological data. However, instead of collecting deer specifically for this project, the results of analysis on deer collected from in and near the 200 Areas for the site-wide surveillance project will be used. In addition, Pacific Northwest Laboratory's (PNL) site surveillance program has begun a study of contamination in and movements of rock doves in the 200 Areas. Samples collected include muscle, bone, and feces. Rock doves are in the same family as mourning doves, a more commonly hunted species, and likely represent the same trophic level. As with deer, no samples have been taken as part of this description of work, but rather results from the PNL study will be incorporated.

3.2.2.5 Predator Endpoint. Predators (loggerhead shrikes) and federal and state candidate classified species are not easily sampled because of legal and societal restrictions. Thus, some measurement endpoints for predators will be the prey base (e.g., insects, small rodents) as described above. Additionally, a concurrent PNL program surveying raptor pellets for gamma-emitting radionuclides will also be referenced to help verify if the lower trophic level results are indicative of raptor contamination consumption and thus potential retention of contaminants.

3.3 SAMPLING AND FIELD ACTIVITIES

At each of the selected waste site sample locations, four vegetation samples were collected. At riparian sites, vegetation known to uptake contaminants such as willows, cattails, or bulrushes were selected for sampling. At those sites where terrestrial species are predominant, deep-rooted plants such as tumbleweed were collected. Since grasses and their seed heads are also consumed by granivorous rodents, grasses were also collected on the terrestrial sites to investigate this potential pathway. In addition, on each site mice were collected utilizing "Sherman" or live-traps set out in transects along (sites 216-B-3 and 216-T-4) or within (sites 216-A-24 and 216-U-11) the site boundaries. The exact sample locations were chosen based on discussions with facility monitoring personnel, who indicated areas with the most significant historical problems. Collected animals were designated as to species, sex, weight, and age class. Finally, at each of the sampling sites, insects were collected with a combination of methods including sweep nets and pit-can traps. Between 10 to 20 g of insects was collected for each sample. Because of the relative scarcity and light weights of insects, both crawling (beetles) and flying (grasshoppers, dragonflies) were collected and combined.

In an effort to correlate the potential for pathway transfer of contaminants from waste sites to affected biota, surface soils (depth = 1 ft or less) were also collected from each of the sampling sites. While some roots extend much deeper than this, most of a plant's roots are in the upper horizon. Because this is a field project and not a controlled laboratory microcosm, the results will be qualitative.

Control samples for each of the media were collected from offsite locations in the Vantage area or other upwind locations. Table 1 contains a summary of the completed sampling effort.

3.3.1 Sample Site Selection

In order to meet the scope and purposes of the proposed FY 1993 ecological assessment of the 200 Areas, selection of appropriate sites for sampling was a primary focus. In order to provide the most useful information based on a limited field investigation, it was necessary that the sites selected for study meet the following criteria.

- They should have a ranking of 28 or higher on the Hazard Ranking System Scale or be designated for additional characterization (Stenner et al. 1988).
- They must be accessible and of reasonably large size to allow collection of the required sampling media.
- Human disturbance should be relatively low or infrequent at the site.

Table 1. Sampling Summary.

Site	Number of samples			
	Soil	Vegetation	Mice	Insects
216-B-3 (riparian)	4	2 cattail 1 bulrush 1 willow	4 deer mice 2 pocket mice	1 (composite)
216-T-4 (riparian)	4	2 cattail 1 bulrush 1 willow	4 deer mice 2 pocket mice	1 (composite)
216-A-24 (terrestrial)	4	2 Russian thistle 1 cheatgrass 1 cheatgrass/ wheatgrass	4 pocket mice	1 (composite)
216-U-11 (terrestrial)	4	2 Russian thistle 2 cheatgrass	4 pocket mice	1 (composite)
Control site (Saddle Mountain Pond)	2	1 bulrush 1 cattail 1 willow 1 Russian thistle 1 cheatgrass	2 pocket mice 2 deer mice	1 (composite)

- Natural vegetation had to be rather abundant at the site or proximal to it to provide food and shelter for the organisms to be sampled.
- The site should have a known or current history of surface or biological contamination.

To initiate site selection, the Hazard Ranking System report (Stenner et al. 1988) was reviewed to develop a list of candidate sites in the 200 Areas with rankings of 28 or higher, or were recommended for additional characterization. This preliminary list was then utilized in conjunction with site maps and experienced professionals to develop a second site list that met the above criteria. This effort identified a total of 10 candidate sites located in 200 East Area and another 18 potential sites in 200 West Area.

This screened list of candidate sites was then used as the basis for site visits and walkthroughs by individuals who were knowledgeable concerning contamination history, ecological systems, and environmental monitoring and surveillance of the 200 Areas. Personnel from the Biological Sciences Team, Environmental Protection, and Environmental Restoration Engineering comprised the site investigation team.

The field screening effort and site walkover resulted in the identification of four primary sites (Table 2) for ecological investigations representing two major habitat types (riparian and terrestrial) and four different facility types (pond, ditch, crib, and trench). The locations of these sample sites are provided in Figures 1 and 2.

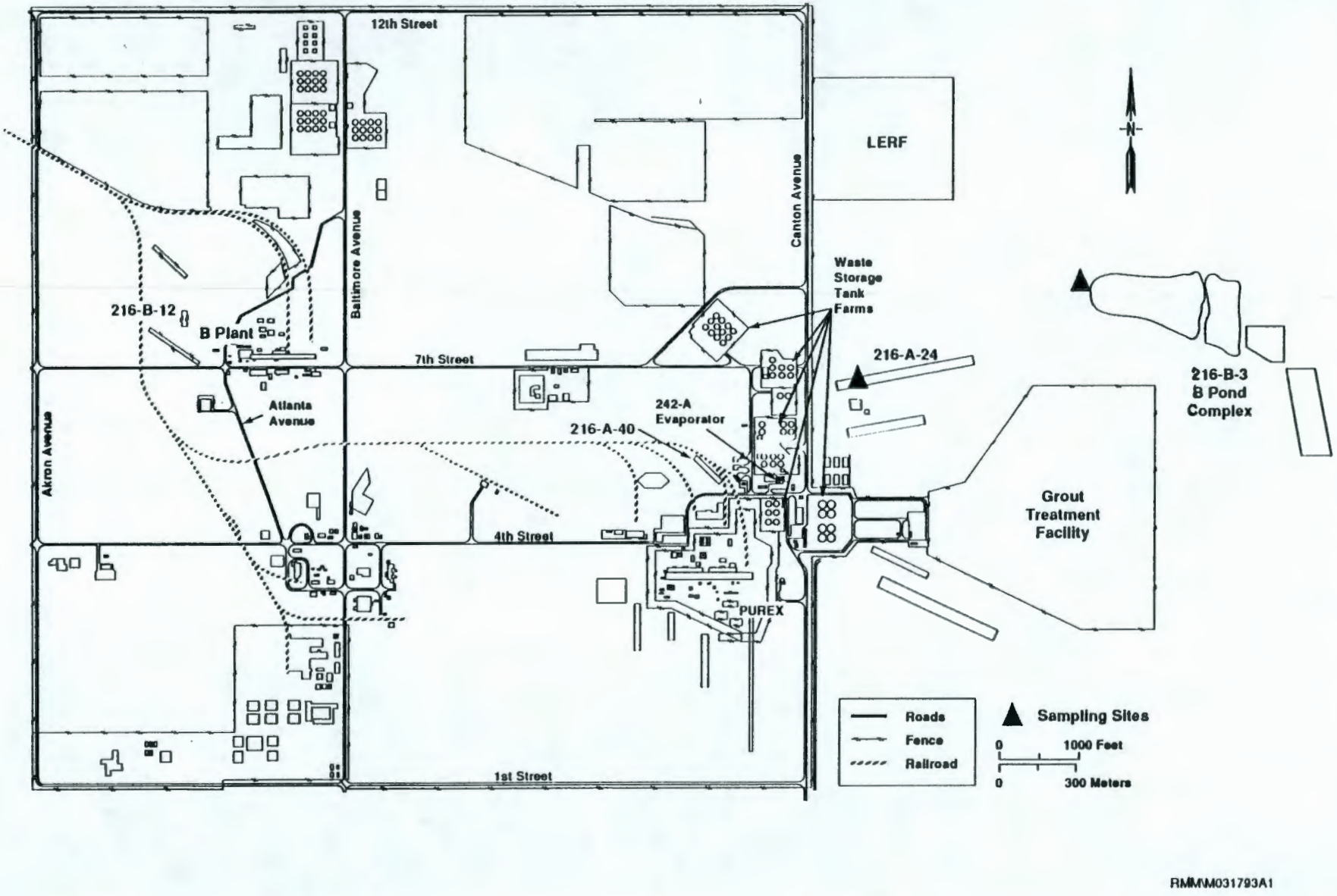

Figure 1. 200 East Area Map Showing Sample Locations.

Figure 2. 200 West Area Map Showing Sample Locations.

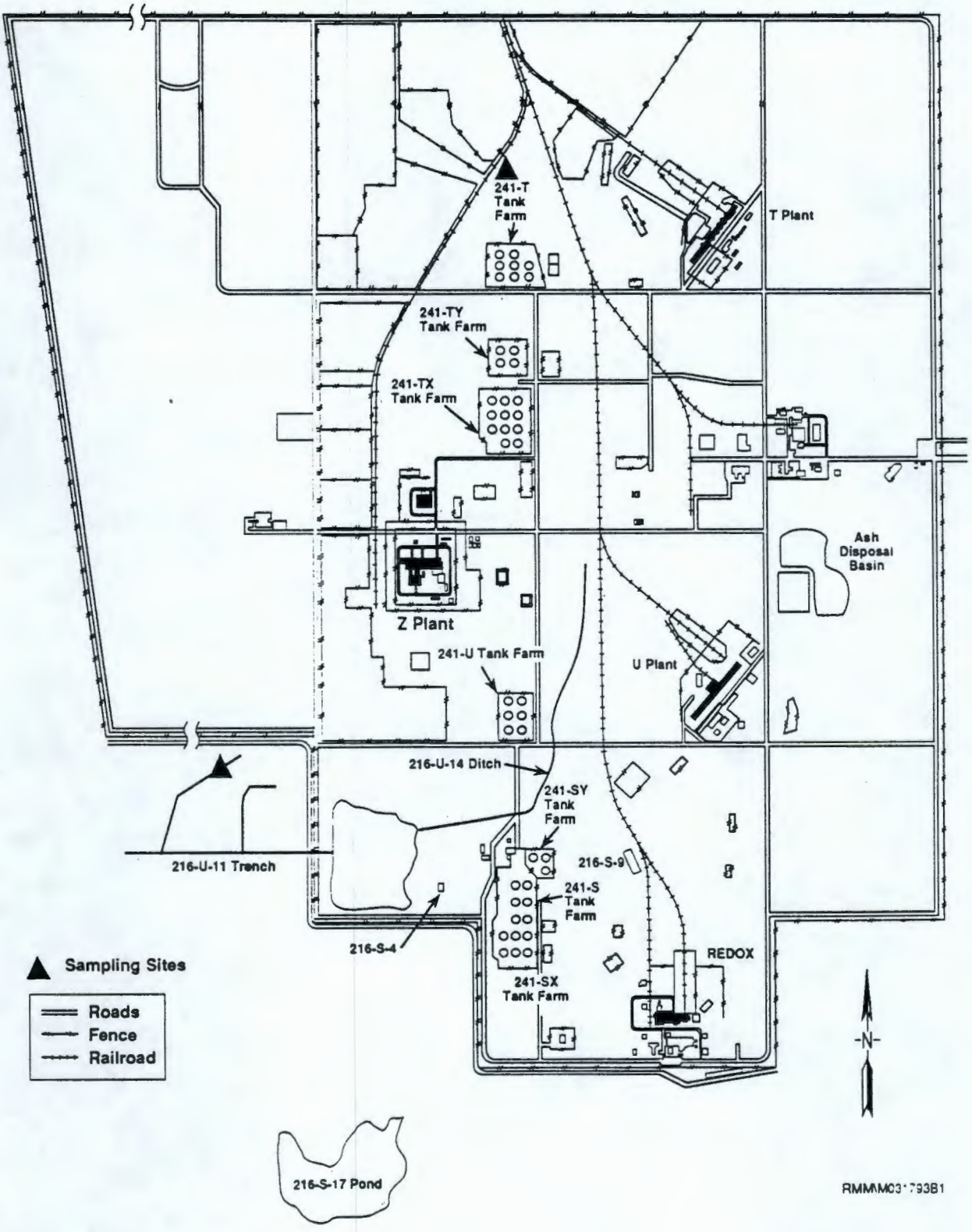

Table 2. Summary of Waste Sites Selected for Ecological Investigations.

Area	Site designation	Facility type	Habitat type	Hazard Ranking System score
200 East	216-B-3	Pond	Riparian	"High"
200 West	216-T-4	Ditch	Riparian	45.3[a]
200 East	216-A-24	Crib	Terrestrial	57.9
200 West	216-U-11	Trench	Terrestrial	37.8

[a]This site did not receive a Hazard Ranking System score because of the lack of inventory data. However, it was recommended as a site having a significant priority for further characterization efforts. The site was also recommended by environmental monitoring personnel based on a history of surface contamination and biological uptake.

3.3.2 Sample Media

3.3.2.1 Vegetation. Deep-rooted plants, grasses, and riparian vegetation were collected in accordance with Environmental Investigations Instruction (EII) 5.3, "Biotic Surveying Sampling," Appendix C (WHC 1988a). Because this study is a qualitative evaluation of a generic plant, the entire plant was sampled.

3.3.2.2 Small Mammals. The collection and preservation of small mammal samples (the entire animal) was conducted following the guidance provided in EII 5.3, "Biotic Surveying and Sampling."

3.3.2.3 Insects. For insect samples the collection and preservation requirements followed EII 5.3, "Biotic Surveying and Sampling."

3.3.2.4 Soils. Soil samples were collected at the plant sampling locations and preserved in accordance with the requirements outlined in EII 5.2, "Soil and Sediment Sampling."

4.0 HEIS SAMPLE LABELING

The Hanford Environmental Information System (HEIS) is used to track the sample and laboratory data obtained during environmental investigations conducted as part of this description of work. Each sample was identified and labeled with a unique HEIS sample number. The HEIS numbers were assigned in the field according to EII 5.10, "Obtaining Sample Identification Numbers and Accessing HEIS Data" (WHC 1988a). The sample location and corresponding HEIS numbers were documented in the field logbook.

5.0 ANALYSES

All samples are being analyzed for the *Comprehensive Environmental Resource, Compensation, and Liability Act* Contract Laboratory Program (CLP) target analyte list (TAL) metals, as well as gamma spectroscopy, strontium-90, and uranium. Soil and vegetation will also be analyzed for technetium-99. This information is summarized in Table 3. These analytes have been identified in the past as the most significant contaminants in biota, and are the most ecologically relevant of the contaminants of concern identified in the 200 aggregate area management studies (DOE-RL 1992).

Table 3. Sample Analyses Summary.

Media	Analyte	Method	Holding time	Container/ volume
Vegetation	TAL (including mercury)	CLP	6 Months 28 Days	P 300 mL
	Gamma Spec. ^{90}Sr Uranium, ^{99}Tc	Lab SOP	6 Months	P 300 mL
	Total Activity	N/A	6 Months	G or P, >1 mL
Insects	TAL (including mercury)	CLP	6 Months 28 Days	P 300 mL
	Gamma Spec. ^{90}Sr Uranium	Lab SOP	6 Months	P 300 mL
	Total Activity	N/A	6 Months	G or P, >1 mL
Mice	TAL (including mercury)	CLP	6 Months 28 Days	Submitted as whole organisms
	Gamma Spec. ^{90}Sr Uranium	Lab SOP	6 Months	
	Total Activity	N/A	6 Months	
Soil	TAL (including mercury)	CLP	6 Months 28 Days	P 300 mL
	Gamma Spec. ^{90}Sr Uranium, ^{99}Tc	Lab SOP	6 Months	P 300 mL
	Total Activity	N/A	6 Months	G or P, >1 mL

CLP = Contract Laboratory Procedure.
G = Glass.
P = Plastic.
SOP = Standard Operating Procedures.
TAL = Target Analyte List.

Methods, holding times, and estimated container requirements (actual quantity of material needed may vary depending on the laboratory doing the analyses) are shown in Table 3. Sample custody will be in accordance with EII 5.1, "Chain of Custody" (WHC 1988a).

6.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Field characterization and surveys were performed as part of this work. To help ensure that data collected are of sufficient quality to support decisions, all work on the Hanford Site is subject to the requirements of DOE Order 5700.6C, *Quality Assurance* (DOE 1991), which establishes quality assurance (QA) program requirements. Quality assurance program requirements so defined apply to all types of projects conducted on the Hanford Site.

To ensure that the objectives of the past-practice activities are met in a manner consistent with DOE Order 5700.6C, all work was performed in compliance with the Quality Assurance Project Plans (e.g., DOE-RL 1993b); Westinghouse Hanford Company's (WHC) existing QA manual, WHC-CM-4-2 (WHC 1988b); and procedures outlined in the QA program plan, WHC-EP-0383 (WHC 1990), which is specific to CERCLA Remedial Investigation\Feasibility Study activities. This QA program plan describes the various plans, procedures, and instructions used by WHC to implement the requirements of DOE Order 5700.6C.

7.0 REFERENCES

DOE, 1991, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.

DOE-RL, 1992, *U Plant Source Aggregate Area Management Study Report*, DOE/RL 91-52, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993a, *Hanford Site Baseline Risk Assessment Methodology*, DOE/RL-91-45, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993b, *Facility Investigation/Corrective Measures Study Work Plan for the 200-UP-2 Operable Unit*, DOE/RL-91-19, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, EPA/540/G-89/004, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1989a, *Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference*, EPA/600/3-89/013, U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, Oregon.

EPA, 1989b, *Risk Assessment Guidance for Superfund*, Volume II, "Environmental Evaluation Manual," EPA/540/1-89/001, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1992, *Framework for Ecological Risk Assessment*, EPA/630/R-92/001, Risk Assessment Forum, U.S. Environmental Protection Agency, Washington, D.C.

Stenner, R. D., K. H. Cramer, and D. A. Lamar, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford*, PNL-6456, Pacific Northwest Laboratory, Richland, Washington

WHC, 1987, *Industrial Safety Manual*, WHC-CM-4-3, Vols. 1-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988a, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988b, *Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988c, *ALARA Protection Manual*, WHC-CM-4-11, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988d, *Radiation Protection*, WHC-CM-4-10, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988e, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington.

Woodruff, R. K., R. W. Hanf, M. G. Hefty, and R. E. Lundgren, 1991, *Hanford Site Environmental Report for Calendar Year 1990*, PNL-7930, Pacific Northwest Laboratory, Richland, Washington.

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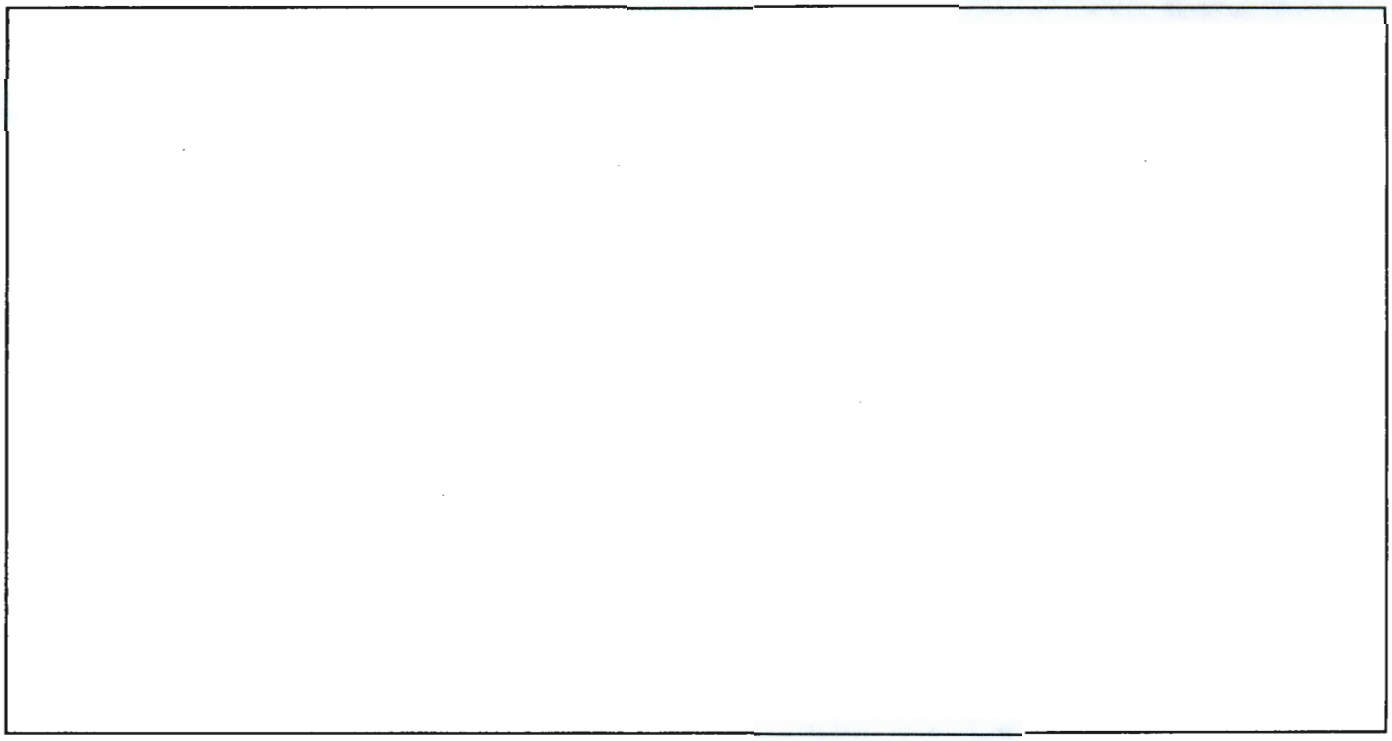

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